Engineering Students' Grade Level Differences of Satisfaction in Using Technology for Learning

Hon Keung Yau[1], Alison Lai Fong Cheng[2]

[1]Department of Systems Engineering and Engineering Management,
City University of Hong Kong, Kowloon Tong, Kowloon, Hong Kong.

[2]Independent researcher, Hong Kong.

[1]honkyau@cityu.edu.hk; [2]alisoncheng_lai_fong@yahoo.com.hk

Abstract

Grade level difference influences the attitude towards the use of technology for learning. However, it is found that there are few researches studying on the grade level difference in the perception of satisfaction in using technology for learning in Hong Kong. Therefore, the aim of the study is to examine the grade level difference in the satisfaction towards using technology for learning in the Hong Kong higher educational institutions. In this study, a survey methodology has been employed to collect a total of 211 questionnaires from engineering departments of one of the universities in Hong Kong. The findings show that lower grade level engineering students are found to have more confidence in using technology for learning than higher grade level engineering students. In addition, there are no significant difference among the different grade level of students.

Keywords

Grade level Difference; Satisfaction; Using Technology for Learning

Introduction

Nowadays, educational technology is popular and can foster the student learning and motivation to learn. In university, it is common that many courses are related to educational technology, which means that students are required to use technology for learning. such as searching information on internet, using software (SPSS, AutoCad, Compiere, PowerPoint, Excel). On the other hand, instructors use technology to teach students such as internet, video, educational software and other telecommunication devices.

Although technologies are used to teach different grade levels of students in higher education, it appears that no research have been done on the grade level difference in the satisfaction towards using technology for learning in the Hong Kong higher education. The purpose of this study is to examine the grade level difference in the satisfaction towards using technology for learning in Hong Kong higher education. The research focuses on the engineering students' grade level difference of the satisfaction in using technology for learning in the Hong Kong higher education.

Literature Review

Grade level difference is one personal characteristic which influences the attitude towards the use of technology for learning (Kahveci, 2010). Previous research pointed out that the lower grade levels had more positive attitudes compared to the students in the higher grade levels (Comber & Colley, 1997; Kay, 2006). Comber and Colley (1997) revealed that younger girls preferred computer much than the older ones. There are two possible explanations, the first of which is that girls lose interest in computing as they get older (Sheingold, 1981). In addition, 'gender intensification' hypothesis proposed by Hill and Lynch (Hill & Lynch, 1983), who suggested that girls become more stereotypically feminine when they reach adolescence. So, they are less likely to engage activities which are seen as masculine. Another explanation is about an age-cohort effect, meaning that the younger girls catch up the technology and then they are more interested in using technology than the older girls (Comber & Colley, 1997). In this study, the year of study (Year 1, 2 and 3) are used as the difference of grade levels. Besides, Hurley and Vosburg (1997) pointed out that the grade level was narrow and the differences in attitude were not apparent among different year of study. In university, the expectation of teachers was that everyone would be successful in use of the technology through the course and there was no grade level difference when

the students used the technology (Korobili & Togia & Malliari, 2010). Moreover, students experience the feelings of satisfaction with the process or results of the learning experience (Keller, 2010). Satisfaction is an equity and a natural and positive consequence. Natural consequences are strategies to provide meaningful chances for learners to apply their newly acquired knowledge; while positive consequences are ways to provide reinforcement to the learners' success. Equity is a tactic to help student to have a positive feeling about their achievements (Keller, 2010).

Based on the above review, we hypothesize:

H1: Engineering students in the lower grade levels are more satisfied than those in higher grade level in using technology for learning.

H2: There are no significant differences among three grade levels.

Research methodology

In this study, a questionnaire survey has been conducted to collect the data in order to examine the gender differences in using the technology for learning. The 'satisfaction' variable of the modified Fennema-Sherman Attitudes Scales (Kahveci, 2010) was used in this questionnaire to investigate the grade level difference of students' satisfaction in using technology for learning. This variable consisted of four questions (Table 1) rated from a 5-point Likert type scale, ranging from 1 "strongly agree" to 5 "strongly disagree".

TABLE 1 ITEMS OF QUESTIONANIRE

Question	Items	Factor loading
1	It would make me happy to be recognized as an excellent student in the use of technology	0.625
2	I'd be happy to get top grades in the courses in which we use technology.	0.707
3	Being first in the competition related with the use of technology would make me pleased.	0.707
4	Being regarded as a smart in the courses in which we use technology would be great thing.	0.612

After the questionnaire was finalized, the pilot study was carried out before distributing questionnaires to a large number of people. We had to test the questionnaire and made sure that it worked as intended. Piloting questionnaire allowed us to judge whether the chosen questions were effective to collect the information. In addition, any problems with the questions can be identified by the pilot study (Lowe, 2006). For example, piloting helped to rephrase the wordings of the questions, the order of the questions and the reduction of the non-response rates (Oppenheim, 1992). Thus, pilot study was an essential part of the research.

During the pilot study, twelve questionnaires were then distributed to the studentswho were asked to complete the questionnaires without any explanation in order to find out whether they understood the questions; then asked to give feedback individually. It was found that some of the questions were similar causing the difficult to understand. So, the similar items have been removed and some questions were rephrased so that the misunderstanding was avoided. After the questionnaire was modified, ten questionnaires were distributed to other students. It was found that they understood the content of the questionnaire and thought the length of the questionnaire was moderate.

After the pilot study, the questionnaires were distributed to the engineering students. The target group of this study was from the year 1 to year 3 university students in a Hong Kong local university. They have all experienced the educational technology in the courses or in high schools. Therefore, the information about the students' satisfaction in using technology for learning can be collected for this target group.

Then we distributed the questionnaire randomly to this target group via email or in the lecture. The target group included five major engineering streams: Industrial Engineering and Engineering Management; Manufacturing Engineering; Mechatronic; Logistic Manangement; and Total quality.

Finally, a large number of questionnaires was collected.

In total, 350 questionnaires were distributed and 211 copies were returned. Thus, the response rate was 60.29%

All the returned questionnaires were useful since the data was relevant and the questionnaires were fully completed.

Prior to bivariate analysis and ANOVA analysis, data was examined to ensure that it was amenable to the use of these techniques. This involved examining the responses to each question for invalid responses and missing values. Then reliability analyses including Cronbach alpha were used to test the reliability of the variable. The Cronbach alpha value of confidence was

0.803. Normally, the alpha value should be greater than 0.7 for well established measures (Nunnally, 1978; Valeberg et.al., 2009). As no alpha value in this survey study was less than 0.7, the results were considered to be consistent and reliable.

In addition to Cronbach alpha, a factor loading of the variable was obtained. Factor loadings less than 0.3 were omitted as it is accepted that only factor loadings on the attributes greater than 0.3 were suitable for interpretation (Comrey, 1973; Valeberg et al., 2009). Since the factor loadings for the four items of satisfaction ranged from 0.612 to 0.707 (Table 1), all four items were retained.

Results

TABLE 2 STATISTICS OF THE PERSONAL DATA OF RESPONDENTS

Personal Details	No. of respondents	Percentage of respondents (%)
Gender		
Male	109	51.7
Female	102	48.3
Age		
< 21	74	35.1
21-25	123	58.3
26-30	10	4.7
31-35	4	1.9
Year of Study		
Year 1	60	28.4
Year 2	75	35.5
Year 3	76	36.0
Mode of study		
Full time	181	85.8
Part time	28	13.3
Exchange	2	0.9
Streams		
Industrial Engineering and Engineering manangement	62	29.4
Manufacturing	49	23.2
Mechatronic	34	16.1
Logistic Management	46	21.8
Total quality	20	9.5

211 students returned the questionnaire, of which, 51.7% were completed by males and 48.3% by females. 35.1% of respondents were under age 21, 58.3% of respondents ranged between 21 and 25, 4.7% of respondents between 26 and 30, 1.9% of respondents between 31 and 35. 28.4% of respondents were year 1 students, 35.5% were year 2 students and 36% were year 3 students. In addition, 85.8% were full time students, 13.3% were part time students and 0.9% were exchange students. Besides, 29.4% of respondents came from Industrial Engineering and Engineering Management; 23.2% from Manufacturing Engineering; 16.1% from Mechatronic; 21.8% from Logistic Manangement; and the rest from Total quality.

In this study, the students were divided into three grade level groups year 1, year 2 and year 3 which came from five engineering streams: Industrial Engineering and Engineering Management; Manufacturing Engineering; Mechatronic; Logistic Manangement; and Total quality.

The mean values for three grade level groups are showed in Table 3. The mean value with year 1 was 2.1583, year 2 was 2.18, and year 3 was 2.3224. Since the questionaiires were randomly distributed to the above five engineering streams' students, the sample of population is representable. Thus, the means value of year one students approached to agree level of 5-point Likert type scale. Therefore. year one students were more satisfaction than year 2 and year 3 students in using technology for learning. This finding was supported by Comber and Colley (1997) and Kay (2006). Thus, the hypothesis 1 was supported.

TABLE 3 MEANS AND STANDARD DEVIATION OF DIFFERENT GRADE LEVELS WITH SATISFACTION.

Year	N	Mean	Standard. Deviation
Year 1	60	2.1583	.64763
Year 2	75	2.1800	.74725
Year 3	76	2.3224	.73237
Total	211	2.2251	.71525

One way ANOVA was then used for testing the differences among the means of three grade level groups. The result is shown in Table 4. Since the questionaiires were randomly distributed to the above five engineering streams' students, the sample of population is representable. According to table 4, there was no significant differences among three grade levels ($F = 1.114$, $p > 0.05$). Therefore, hypothesis 2 was supported. This finding was supported by Hurley and Vosburg (1997) and Korobili, Togia, Malliari (2010).

TABLE 4 ANOVA FOR GRADE LEVEL WITH SATISFACTION

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.139	2	.570	1.114	.330
Within Groups	106.293	208	.511		
Total	107.432	210			

Discussion

The survey results accepted the hypothesis 1 since the mean value with year 1 was 2.1583, year 2 was 2.18, and year 3 was 2.3224. Thus, year one students were more satisfaction than year 2 and year 3 students in using technology for learning. This finding was

supported by Comber and Colley (1997) and Kay (2006).

The survey results also accepted hypothesis 2 since there was no significant difference in the perception of satisfaction in using technology among grade levels. Hurley and Vosburg (1997) and Korobili, Togia , Malliari (2010) found the similar results. Firstly, Hurley and Vosburg (1997) pointed out that the grade level was narrow and the differences in attitude were not evident among different year of study. However, this explanation could not apply in this study since there were three grade levels and it should be enough to examine the difference among three year of study (Kahveci, 2010). Secondly, the teachers' expectations in the use of technology have changed and this change might eliminate any differences in students' attitudes among the three grade levels (Hurley & Vosburg, 1997). In university, the expectation of teachers was that everyone would be success in use of the technology through the course and no grade level difference in the expectation of the use of technology (Korobili et al., 2010). Moreover, different grade level of engineering students would attend the same course related to the use of technology. Instructors would not expect that year 3 students would perform better in the course since different level of students could attend the same level course at the same time. Thus, the students perceived the same expectation in the course. Therefore, there were no significant difference among the three grade levels in this study.

Conclusion

It was concluded that lower grade level engineering students have been found to have more confidence in using technology for learning than higher grade level engineering students. Besides, there is no significant difference among the three grade levels of students. This study contributed to engineering students' grade level difference of satisfaction in using technology for learning in Hong Kong higher education. Based on this study's findings, Understanding can be deepened on different grade level of engineering students' perception of satisfaction in using technology for learning. These findings can also enable the university's educators to integrate technological components in their courses to enhance engineering students' satisfaction in using technology for learning.

The major limitations of this study were the small sample size and only the survey technique was used. In the future study, qualitative technique like interview should be used to explore the reasons why lower grade level engineering students have more confidence in using technology for learning than higher grade level engineering students in Hong Kong higher education. In order to improve the generalization, the focus should be put on all Hong Kong's universities.

REFERENCES

Comber, C. and Colley, A. The effects of age, gender and computer experience upon computer attitudes the effects of age, gender and computer experience upon computer attitudes. Educational Research, 39(2), 123, 1997.

Comrey AL. A first course in factor analysis. New York: Academic Press, 1973.

Hill, J. P., & Lynch, M. E. The intensification of gender-related role expectations during early adolescence. In J. Brooks-Gunn & A. C. Petersen (Eds.), Girls at puberty: Biological and psychosocial perspectives, pp. 201-228), New York: Plenum, 1983.

Hurley, N. P., & Vosburg, J. D. Modern technology: The relationship between student attitudes toward technology and their attitudes toward learning using modern technology in an everyday setting (Publication no. ED415841). Retrieved 10/03/2011, from ERIC (Educational Resources Information Center) database (1997)

Kahveci, M. Student's perceptions to use technology for learning: measurement integrity of the modified fennema-sherman attitudes scales. The Turkish Online Journal of Educational Technology 9(1), 185-201, 2010.

Kay, R. A systematic evaluation of learning objects for secondary school students. Journal of Educational Technology Systems, 35(4), 411-448, 2006.

Keller, J. M. Motivational design for learning and performance. Springer ,2010.

Korobili, S., Togia, A., Malliari, A. Computer Anxiety and attitudes among undergraduate students in Greece. Computers in Human Behavior, 26(3), 399-405, 2010.

Nunnally J. Psychometric theory. New York: McGraw-Hill, 1978.

Lowe, M.. Beginning Research: A guide for foundation degree students. Routledge, 2006.

Oppenheim, A. N. Questionnaire design, interviewing and

attitude measurement. London: Pinter Publishers, 1992.

Sheingold, K. Issues related to the implementation of computer technology in schools: a cross-sectional study. Paper presented at the NIE Conference on Issues Related to the Implementation of Computer Technology in Schools, Washingtin, DC, 1981.

Valeberg, B. T., Hanestad, B, R., Klepstad, P., Miaskowski, C., Moum, T., & Rustoen, T. Cancer patients' barriers to pain management and psychometric properties of the Norwegian version of the Barriers Questionnaire II. Scandinavian Journal of Caring Sciences 23, 518-528, 2009.

Dr. Hon Keung Yau, PhD, Department of Systems Engineering and Engineering Management, City University of Hong Kong. His research interests include organizational learning, quality management and school management.

Dr. Alison Lai Fong Cheng, EdD. Independent researcher, Hong Kong. Her research interests include quality management and school management.